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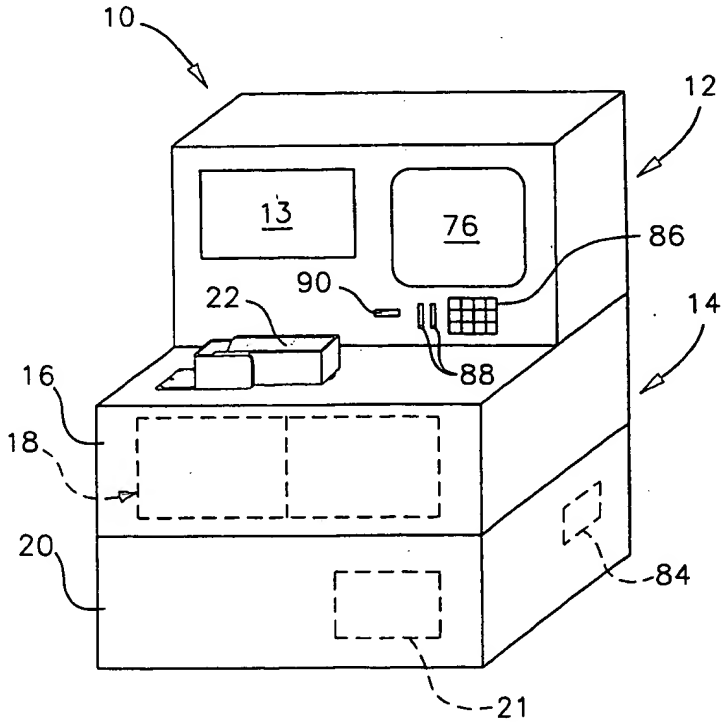
(54) Title: MULTI-TRANSACTION COIN MACHINE

(57) Abstract

A multi-transaction coin machine (10) is provided which accepts a number of coins, counts the coins and displays the value to a user. The user is presented a variety of options in exchange for the coins, including a receipt redeemable for cash, or a variety of electronic financial transactions, including paying bills or purchasing tickets. The multi-transaction machine (10) is an innovation in self-service convenience, efficiency and functionality, providing the services of a variety of machines, such as coin machines, ATMs, ticket services, and bill paying services all in a single user-operated machine.



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MULTI-TRANSACTION COIN MACHINE

FIELD OF THE INVENTION

The present invention relates generally to coin machines, and more particularly, to coin counting machines with multi-transactional capability.

BACKGROUND OF THE INVENTION

Convenience transactional machines operable directly by end users exist in a variety of forms. There are, for example, ATMs (automatic or automated teller machines) which dispense money, thereby avoiding the lines common in banks, and also providing access to funds in a multitude of locations and after normal banking hours.

Coin counting machines are also commonplace. Many of these machines require an experienced operator and are not geared for use by the end user. Those machines operable by the end user generally provide the user with a voucher redeemable for cash or merchandise. The end user must then wait in line, and perhaps even travel to a different location, to redeem the voucher for cash or merchandise.

Telephone operated machines which sell movie or event tickets with credit card payments and remote ticket pick up are also known. There are a variety of machines which, by way of example, dispense stamps, tickets, coupons, money orders, bank transactions or the like. U.S. Pat. No. 5,021,967 by Smith discloses an exemplary money order dispensing machine. Although it offers convenience with a quick and efficient method for dispensing money orders, this machine is meant to be operated by a system operator, not the end user or customer, and therefore does not require the capability to receive money. The '967 device is intended for clerks, not end users; it is merely dispensing money orders, and not actually transacting the sale. (The sale is a separate transaction, where the clerk receives the money from a customer.)

Similarly, there are machines that dispense lottery tickets, but again, they are meant to be operated by a system operator, not a customer, and therefore do not require the capability to receive money.

Although the conventional transactional machines all provide a limited level of convenience, they do not provide an integrated array of services directly to the end user. In addition to being single function machines, those machines presently available generally require an attendant to receive money and operate the machine, and are not independently operable by the end user. Coin machines presently do not offer financial transactions in exchange for coins. Convenience machines currently available generally do not offer the convenience of multiple transactions, do not offer the convenience of multiple payment sources, and do not offer the convenience of self service by the user. Bill paying services generally available are through a

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subscription, or an automatic withdrawal from a bank account. Further, it is well recognized and appreciated that there is a shortage of personnel necessary to provide a full complement of retail service employees.

Therefore, what is needed is a self-contained user-operable coin machine with multi-transactional capability. Preferably, such a coin counting machine would not be limited to coin transactions, but rather would be capable of accepting currency, debit cards, credit cards, smart cards, and the like.

SUMMARY OF THE INVENTION

A preferred embodiment of the present invention is directed to an integrated financial transaction terminal that satisfies this need by allowing the user to perform a variety of transactions, from paying bills to making purchases, utilizing a variety of payment means, including coins, currency, credit cards, debit cards, smart cards, and the like.

There is, therefore, provided in accordance with a preferred embodiment of the present invention a coin machine that includes a coin hopper with a container for coins, and a feed for feeding the coins in the container to a coin discriminator sensor. A controller calculates the monetary value of the coins in response to the coin discriminator sensor. Preferably, a transport device is provided for transporting the coins from a user to the container at a controlled flow rate, the flow rate being a function of the quantity of coins in the container. An exemplary transport device is a conveyer belt. It is also desirable that the controller cause the container to dispense debris after all the coins have been extracted from the container by the feed. In a preferred embodiment, the feed includes a moveable backplate bias toward the container and a circular disc rotatably mounted to the moveable backplate. In this embodiment, the controller causes the container to dispense the debris by moving the moveable backplate away from the container.

Multi-transactional capability with a coin machine is achieved with a coin counter for receiving coins from a user, and a coin discriminator for discriminating denominations of the coins. A user interface is provided for selecting one of a number of transactions. A controller determines the monetary value of the coins as a function of the discriminated denominations and generates instructions for a remote terminal, the instructions comprising a command to apply the determined monetary value of the coins to the selected transaction. The coin machine may also be capable of receiving currency, credit cards, debit cards and smart cards. Preferably, the coin machine interfaces with a remote service provider either directly or through a host terminal.

The multi-transaction coin machine offers a significant improvement, offering the user a variety of payment options. The user may elect to receive a receipt for cash or credit towards purchases at the store, but may also, among other transactions: pay bills, buy lottery tickets, buy catalog merchandise, buy event tickets, buy movie tickets, buy airline tickets, or deposit the

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money in a bank account. Further, if the amount of the coins deposited is insufficient to effect the desired transaction, the user may cover the difference with currency, a credit card, a debit card or a smart card. Moreover, by providing automated electronic transactions, at any time of day, the number of transactions that must be carried out by employees can be drastically reduced.

An attractive feature of preferred embodiments of the present invention is the ability to provide the general public access to electronic financial transactions, rather than restricting electronic transactions only to those with credit cards. Using only coins and cash, a user could complete a variety of other transactions electronically. For example, purchase of airline tickets could now be accomplished without the use of a credit card.

It is understood that other embodiments of the present invention will become readily apparent to those skilled in the art from the following detailed description, wherein it is shown and described only embodiments of the invention by way of illustration of the best modes contemplated for carrying out the invention. As will be realized, the invention is capable of other and different embodiments and its several details are capable of modification in various other respects, all without departing from the spirit and scope of the present invention. Accordingly, the drawings and detailed description are to be regarded as illustrative in nature and not as restrictive.

DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

DETAILED DESCRIPTION

Coin counting machines provide a convenient means for exchanging loose coins for currency. Generally, these coin counting machines accept coins from a user, sort and count the coins, calculate the value of the coins, and provide the value of the coins to the user with, by way of example, a printed receipt. The printed receipt can then be exchanged for goods, services or currency.

In a preferred embodiment of the present invention, a coin counting machine is equipped to apply the calculated value of the coins to any number of possible transactions selected by the user. This multi-transaction coin machine accomplishes its goal with a novel combination of services, consolidated into a single terminal for maximum convenience and efficiency to the user.

Referring to FIG. 1, an exemplary coin counting kiosk 10 in accordance with a preferred embodiment of the present invention is shown. The coin counting kiosk 10 is a self-contained chassis having an upper cabinet 12 mounted on a rearward portion of the upper surface of a lower

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cabinet 14. The lower cabinet 14 is further divided into an upper portion 16 which houses a coin counting module 18, and a lower portion 20. It should be noted that the coin counting kiosk 10 chassis could take on many configurations depending on the particular environment in which the chassis is placed. With the upper cabinet 12 mounted on the rearward portion of the lower cabinet 14, a coin input tray 22 is conveniently mounted on the upper surface of the lower cabinet 14 in front of the upper cabinet.

In the preferred embodiment, the kiosk may be accessed exclusively from the front. Depending on the location and the installation, some embodiments may provide access exclusively in the rear of the device.

The upper cabinet 12 may provide a convenient method for commercial advertising with, by way of example, an illuminated light box 13, with advertising messages displayed on the exterior of said light box. In other embodiments, advertising or other messages may be displayed by a scrolling message sign, an animated sign, or by an LCD panel with video.

As shown in FIG. 2, the coin input tray 22 is constructed with a generally rectangular bottom surface 24 with a peripheral wall 26 enclosing three ends. The open end of the coin input tray 22 is positioned over an aperture 28 in the upper surface of the lower cabinet. The aperture 28 leads to the internally mounted coin counting module 18. A guard 30 is positioned around the aperture 28 so that when the bottom surface of the coin tray 22 is flush with the upper surface of the lower cabinet, the open end of the coin input tray 22 is forced up against the guard 30, preventing any coins from being introduced into the coin counting module 18. When the coin input tray 22, which is hinged with the guard 30 at the open end, is lifted from the opposite end, a small clearance 23 is formed between the bottom surface 24 of the coin input tray 22 and the guard 30. As a result, the coins in the coin input tray 22 are introduced into the coin counting module 18 through the small clearance 23. Preferably, the hinged coin input tray 22 is equipped with a lock down mechanism 32 that prevents unauthorized use. The lock down mechanism 32 can be implemented with a number of devices, by way of example, an arm 34 that extends from the internal portion of the machine and connects to the bottom of the coin input tray 22. Another embodiment utilizes a solenoid, which in its relaxed position protrudes into a side wall of the input tray, requiring power to the solenoid to release the coin input tray.

Another embodiment of the input tray provides an input tray with perforated surfaces, to allow liquid or debris to escape. In its resting position, the coin input tray would rest on a collector pan mounted directly below the coin input tray in the upper portion 16 of the lower cabinet 14, just beneath the upper surface of the lower cabinet. This collector pan would collect any debris or liquid escaping the coin input tray.

The mechanical features of a preferred embodiment of the coin counting module are shown in FIG. 3. A coin hopper 34 is used to collect the coins deposited into the machine and

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individually feed each coin, one at a time, to a coin discriminator sensor 36. To avoid overloading the coin hopper 34, a transport device is used to control the flow rate of coins into the coin hopper 34. A conveyer belt 38 extending from just below the aperture in the lower cabinet to the coin hopper 34 is one method for regulating the flow of coins into the coin hopper 34. It will be apparent that the same function can be achieved with a ramp, chute, lever or other means known in the art.

The coin hopper 34 includes a container 40 positioned at the end of the conveyer belt 38, and a moveable backplate 48 biased toward the container 40. In operation, the conveyer belt 38 causes the container 40 to fill with coins. A circular disc 44 rotatably mounted on the moveable backplate 42 extracts coins as it is rotated through the coin filled container 40 and feeds them onto a coin rail 46 one at a time. The coin rail 46 is mounted on the moveable backplate 48 at an incline. As each coin is moved down the inclined coin rail 46, it travels past the coin discriminator sensor 36 mounted behind the moveable backplate 48. The coin discriminator sensor 36 obtains a magnetic and/or electrical profile of each coin and forwards this profile to a controller 42 for further analysis. The controller 42 is preferably an embedded microprocessor based computer with a small footprint, such as a PC104 system. The controller 42 uses this profile to determine whether the coin is authentic, and if so, the value of the coin.

The range of profiles for acceptable coins is controlled through software, so that accepting other currencies requires only a simple software change. Other embodiments may utilize profiles to recognize tokens, or any coin shaped objects.

In the event that the controller 42 determines that the coin passing the discriminator sensor 36 lacks authenticity, a solenoid 52 mounted in the moveable backplate 48 downstream from the coin discriminator sensor 36 expels the non-authentic coin from the coin rail 46 into a rejection chute 54. The timing of the expulsion of the non-authentic coin is controlled by a sensor (not shown) within the solenoid 52 which detects the passing of the non-authentic coin. Those coins deemed authentic by the controller 42 continue along the coin rail 46 and fall into a storage container 21 located in the lower portion of the lower cabinet.

In one embodiment, an "escrow" feature allows the user to end the transaction and receive back the coins deposited. As the coins exit the coin rail 46, they are temporarily stored in an escrow container (not shown). The container is equipped with a level sensor. When the escrow container is full, or if not full, when the user has input all their coins, the user is provided the coin count and value, and queried whether to accept or reject the count. If the user accepts the count, the controller causes the escrow cup to empty the coins into the storage container. If the user rejects the count, the controller causes the escrow cup to empty the coins into a reject chute where they are returned to the user.

In another embodiment, the coins are sorted prior to being stored. Storage boxes are

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provided for each denomination of coin. A second coin rail may be used to effect the sorting, with appropriately positioned slots or knife arms to cause the correct denominations to fall into the respective storage containers.

As suggested above, the controller 42 manages the coin counting functions. A switch (not shown) for sensing the lifting of the coin input tray signals the controller 42 to begin the coin counting process. In response, the controller 42 applies power to a fixed speed conveyer belt motor (not shown) causing the coins input into the coin counting module from the coin input tray to be conveyed to the coin hopper 34. Concurrently, the controller 42 applies power to a fixed speed disc motor (not shown) which causes the circular disc 44 to rotate about its central axis. The circular disc 44 is preferably formed with a number of spaced apart holes 62 arranged around its periphery. Each hole 62 operates to extract a coin as it is rotated through the coin filled container 40. Another embodiment uses a disc with raised radial ridges or ledges extending outward from the center of the disc, with a depth adequate to extract coins. The extracted coin is then fed onto the coin rail 46 through a narrow slot 64 defined by the circular disc 44 and the moveable backplate 42 adjacent the coin rail 46.

A level sensor 66 mounted to the exterior of the coin hopper 34 is used by the controller 42 to monitor the level of the coins in the container 40. Once the level of coins in the container 40 exceeds a threshold level, the controller 42 removes power from the conveyer belt motor shutting down the flow of coins into the coin hopper 34. As a result, the level of coins in the coin hopper 34 can be reduced as coins are depleted from the container 40 by the rotating action of the circular disc 44. Once the level of coins in the coin hopper 34 drops below the threshold level, the controller 42 reapplies power to the conveyer belt motor reestablishing the flow of coins from the conveyer belt 38 into the coin hopper 34.

To prevent non-authentic coins, inclusive of objects other than coins, from blocking the narrow slot 64 and perhaps locking up the circular disc 44, a second solenoid 67 is located adjacent to the upper end of the coin rail 46, and when activated extends through a cylindrical cut-out portion of the moveable backplate 42 and into a peripheral hole 62, expelling the non-authentic coin. The second solenoid 67 is activated by the controller 42 when the circular disc 44 locks up. This condition can be detected in a number of ways. By way of example, level sensor 66 senses coins in the container 40 but the coin discriminator sensor fails to detect any coins traveling down the inclined coin rail 46, then the controller 42 determines that the circular disc 44 locked up and activates the second solenoid 67 in an attempt to reinstate proper operation of the coin counting module.

After all the coins in the coin hopper 34 have been counted, the controller 42 removes power from the conveyer belt motor and disc motor, and calculates the total monetary value of the coins received by the coin counting module. Again, detecting the completion of the coin

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counting process can take a variety of forms. In the described embodiment, the controller 42 determines that the transaction is complete when the level sensor 66 indicates that the coin hopper 34 is empty and the coin discriminator sensor 36 no longer detects any coins traveling along the coin rail 46. Motion sensors (not shown) could also be used to detect whether the conveyer belt 38 and the circular disc 44 are still active. This approach results in a more reliable determination by the controller 42 that the transaction has in fact been complete. For example, if the controller 42 determines that the coin hopper 34 is empty and that no coins are being detected by the coin discriminator sensor 36, higher reliability could be obtained by verifying that the conveyer belt 38 is moving. If the conveyer belt is stalled, there still may be coins that need to be counted notwithstanding the fact that the coin hopper 34 is empty and the coin discriminator sensor 36 is no longer detecting coins.

After the completion of the transaction, it is desirable to perform a number of automated maintenance procedures on the coin counting module. By way of example, it has been found that higher reliability can be achieved by periodically removing accumulated debris from the coin hopper 34. To this end, after power is removed from the conveyer belt motor and disc motor, the controller applies power to a coin hopper motor 68 which causes the moveable backplate 42 to move away from the circular disc 44 thereby releasing any debris that may have accumulated in the container 40. Another useful maintenance procedure entails the removal of debris from the coin rail 46 especially around the coin discriminator sensor 36 and the narrow slot 64 defined by the circular disc 44 and the moveable backplate 42. This is accomplished, in a preferred embodiment of the present invention, with two small air hoses 70, 72 mounted on the moveable backplate 48 above the coin rail 46 and directed at the coin discriminator sensor 36 and the circular disc 44. While the moveable backplate 42 is still moved away from the circular disc 44, a compressor (not shown) is activated by the controller 42. As a result, the two small hoses 70, 72 connected to the compressor, direct an air stream at the coin discriminator sensor 36 and the circular disc to remove any debris that has accumulated on the coin rail 46. Another embodiment utilizes a single hose mounted on the moveable backplate 48 just above the upper end of the coin rail 46. The hose is aimed downward at the upper end of the coin rail, which results in an air flow along the length of the coin rail.

The operation of the coin counting module is controlled by a central computer housed in the upper cabinet of the coin counting kiosk. An electrical block diagram of the central computer and associated circuitry is shown in FIG. 4. In a preferred embodiment of the present invention, the central computer 74 is an Intel based PC system, coupled to a number of peripheral devices including a touch screen display 76, random access and read only memory storage 78, magnetic or other storage device 80, communications links 82, an uninterruptible power supply 84, input/output ports, and a user interface. The user interface can be any number of devices

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including a PIN pad 86, a card reader 88, a currency acceptor 90, a dispenser for pre-paid phone cards 92, a receipt printer 94, one or more ticket or coupon printers 96, MICR magnetic ink reader 93, an optical character recognition (OCR) scanner 95 to input printed data, a money order printer 97, or any other device known in the art. Virtual input devices may also be used, such as an on-screen virtual keyboard or keypad. Other user interface devices may include user identification devices such as a retinal scanner, video camera, thermal imager, biometric device 91 or other identification device. Preferably, several printers are used, including an event ticket printer and a receipt printer, and appropriate slots (not shown) are formed in the upper cabinet so that print outs from such printers may be received by the user.

In the described embodiment, the central computer 74 uses a digital input/output board 75 to communicate with and control the peripheral devices. This board may utilize Visual Basic, C, C++ or assembly language software to send and receive the data necessary to control the peripheral devices. The peripherals are attached and controlled via a bus. In the preferred embodiment, a Universal Serial Bus is used. Other embodiments may use a Controller Area Network (CAN) Bus, a Small Computer Systems Interface (SCSI) Bus, an Industry Standard Architecture (ISA) bus, an Extended Industry Standard Architecture (EISA) bus, a Peripheral Component Interconnect (PCI) bus, a Micro Channel bus, a Personal Computer Memory Card International Association CardBus (PCMCIA), or an IEEE 1394 bus or any ANSI or IEEE bus standard. An embodiment may also utilize the Intelligent I/O (I20) architecture developed by the I20 Special Interest Group. The communications links 82 may include POTS, ISDN or DSL modems, and can use TCP/IP for Internet connections. Another embodiment may use an RS-232 serial connection. An embodiment might include a direct network connection, such as an Ethernet connection using either shielded or unshielded twisted pair, coaxial or fiber optic cables. Other communication links might include an optical connection, a wireless RF modem connection, a cellular modem connection, or a satellite connection.

The touch screen display 76 of the coin kiosk is the primary means of communication between the user and the multi-transactional coin counting machine. Initially, the touch screen display 76 displays a message to the user and a start button. The coin kiosk is initially activated by touching the start button on the touch screen panel display 76. A self-diagnostic procedure is performed by the central computer 74 to ensure that all systems are operable, and the coin counting module is enabled. If operable, a message is displayed to the user to begin depositing coins into the input tray. Simultaneously, the central computer 74 releases the lock down mechanism 32 on the coin input tray 22. Once the user deposits the coins into the coin input tray, the user is instructed by the touch screen display 76 to lift the coin input tray 22 to begin the coin counting operation. As an optional feature, graphics could be displayed on the touch screen display 76 once the coins have been input into the coin counting module.

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Returning to FIG. 1, the lower portion 20 of the lower cabinet 14 is used to store the coins after they have been counted by the coin counting module 18. The method of storage can have a significant impact the commercial efficiency of the retrieval process by authorized personnel and the effectiveness against fraud and theft. In a preferred embodiment, the coins are stored in a "smart box" 21 which stores information in a non-volatile memory device about when the smart box was installed, when it has been opened, and how many and what type of coins it contains. One embodiment of a smart box utilizes a memory button, which is a stainless steel encased flash chip, to store the data. This information can then be extracted from the "smart box" by the central computer in the upper cabinet and recorded in one of the peripheral storage devices described above. Alternatively, a non-memory secure storage container, such as a steel coin box, could be used. In another preferred embodiment of the present invention, a carousel supporting a number of canvas bags can be used. The canvas bags preferably meet banking industry standards for ease of removal and transportation. The carousel is arranged with one canvas bag positioned below the coin counting module 18 such that coins, deemed authentic by the controller 42, that continue along the coin rail past the rejection chute fall into that canvas bag. When the canvas bag is full, as determined by the central computer in the upper cabinet by the value of coins computed by the controller in the coin counting module, a carousel motor (not shown) is activated causing the carousel to rotate such that a new canvas bag is located below the coin counting module 18.

It is also desirable to house additional hardware components, such as telephone and other communication wiring, and the power connections for the coin kiosk in the lower portion 20 of the lower cabinet 14. An uninterruptible power supply 84 is also preferably located in the lower portion.

As a security measure, the lower portion 20 of the lower cabinet 14 can be electro-mechanically locked, and controlled by the central computer. In a preferred embodiment of the present invention, access to the lower cabinet requires one to "swipe" a security card in the card reader provided, and/or enter an access code on a keypad or on a virtual keypad displayed on the touch screen. This card and code system will prevent unauthorized access to the stored coins. The upper portion of the lower cabinet may also be electro-mechanically locked. In the preferred embodiment, access to the lower and upper portions of the lower cabinet, and the upper cabinet is authorized by different codes, and access to the respective cabinets must be separately obtained through the central computer. Thus, a security card and/or code for a technician may give him or her access only to the coin counting module 18 in the upper portion 16 of the lower cabinet or the electronics in the upper cabinet, whereas a security card and/or code for an armored security personnel may give him or her access to only the lower portion 20 of the lower cabinet 14.

The central computer 74 is also linked to the controller 42 for the coin counting mechanism, and is also linked to a cabinet controller 89 which controls access to the upper and

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lower cabinet, and also operates the locking devices and the locking mechanism 32 on the input tray 22.

After all coins have been processed, the controller 42 processes the received data, calculates an exchange value for the coins, and displays this information on the touch screen 76 for the user to read.

The user is then offered a variety of exchange options for the coins, including ending the transaction and returning the coins to the user, using the escrow feature discussed previously. In the preferred embodiment, the options are displayed on a video screen, prompting the user for responses, and allowing the user to respond through a system of hierarchial and contextual menus, or when no menu selection is appropriate, allowing the user to enter a response.

The user may request a receipt redeemable for cash or merchandise. Alternatively, the user may conduct electronic transactions, such as applying the exchange value of the coins towards a purchase, such as movie tickets, lottery tickets, event tickets, or airline tickets or applying the exchange value toward payment of a bill, such as power, gas, water, phone, cable or credit cards. Other embodiments may offer other transactions and purchases, such as catalog items, pre-paid phone cards, money orders or other electronic transactions.

In the preferred embodiment, the electronic transactions are effected by contact with a remote terminal. The computer in the kiosk, referred to for convenience as the kiosk PC, is networked to a host computer, remote from the kiosk. The network connection is preferably a dedicated direct connection, but may also be a standard modem connection, a wireless RF modem connection, a cellular modem connection, or any other network connection, such as an Ethernet connection. An Internet connection may also be utilized, using TCP/IP or other Internet protocol, through a dial-up connection, or an ISDN connection, or a dedicated Internet connection such as a cable modem or other digital or optical connection, or any other Internet connection available.

The PC in the kiosk and the remote host computer may use a distributed client/server architecture, to enable "on the fly" changes through changes made to the host computer software. All software and firmware in the kiosk may be updated or changed either remotely from the host or locally with an electronic device linked directly to the kiosk PC. For example, initial settings and configurations may be set at a kiosk by the kiosk connecting to the host. Any subsequent changes in the configuration for each connected kiosk could be made at the host, with a scheduled date for such changes to take place. Each time a kiosk contacts the host, it looks for changes to configuration files. The kiosk would automatically poll the host for changes, update its own software, and the change would take effect on the scheduled date. By way of example, one or many kiosks could be programmed to begin accepting certain tokens on a certain date, all from modifications made in the host software. Of course, these changes could also be made locally at

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each kiosk PC by means of a connection between an electronic device, such as a laptop or hand held computer, and the kiosk PC. In the preferred embodiment, the distributed client/server architecture is JAVA-based. An embodiment may utilize other languages such as C++. An embodiment may utilize standard technologies such as Internet Inter-ORB Protocol (IIOP), HTML, and Object Management Group (OMG) protocols.

FIG. 5 shows a functional block diagram of a host terminal managing the transactions of a number of kiosk coin machines with a number of service providers in accordance with a preferred embodiment of the present invention. As shown, each kiosk has two-way communication with the remote host computer. The host computer in turn has two way communication with a plurality of remote terminals. For illustrative purposes, these remote terminals have been labeled in FIG. 5 with names representative of likely remote terminals that would be contacted by the host computer. For example, the remote terminal ATM/POS represents a known banking network which currently supports automatic teller machine and point of sale transactions. This network would be contacted to verify and obtain funds and to make deposits. Other existing networks are utilized to verify and process credit card transactions.

In a typical transaction, the kiosk PC would prompt the user for information on the desired transaction. The kiosk PC would then transmit this information to the host computer. The host computer would format the transaction in the appropriate industry-standard protocol, then contact the remote terminal. The data received back from the remote terminal would be processed by the host computer, formatted for a kiosk PC, and relayed back to the appropriate kiosk PC. This series of communication steps between a kiosk, the host and one or more remote terminals may be carried out several times for each transaction. For example, in purchasing an event ticket, the kiosk would first have to send reservation data. If the user were paying partially with coins and partially with an additional payment, the additional payment information would be sent to the host to be verified and obtained. Finally, the financial transaction would have to be completed to pay for the tickets.

In addition to processing transactions, the host computer may be used to monitor the individual kiosks. On a scheduled interval, the kiosks may transmit data regarding amount of coins stored, amount of currency received, level of paper or ticket stock, or other diagnostic and maintenance information to the host computer. The host may also initiate contact with the individual kiosk PCs, polling for data such as when components need service based on their use. The host may then evaluate the priority of service requirements for each kiosk, and schedule technicians accordingly. If the host finds that service is required, it may initiate a service call through an e-mail message to a paging service, which in turn pages a technician. Until the e-mail is acknowledged, the host will continue to send the service requests. The technician who responds to the page and services the unit enters a response in a two-way pager to signify who

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performed the service and what work was done. A technician can also initiate a diagnostic check through a two-way pager message, which is relayed by e-mail to the host, with the host instructing the kiosk PC to begin a diagnostic program.

In another embodiment, each kiosk PC could be networked to a single host, or each kiosk could be completely independent, originating its own communications to third parties to effect transactions. Reference to contacting a remote terminal include both the kiosk PC contacting a host, and the host contacting a remote terminal, or the kiosk PC contacting a remote terminal directly.

In the preferred networked environment, each kiosk PC would send transaction instructions to the host computer. The host computer would translate these instructions to the appropriate protocol, contact the third party, receive the information, translate into a new format if necessary, then transmit the information to the appropriate kiosk PC. In a non-networked environment, the individual kiosk PC would communicate directly with third parties, and perform all necessary protocol translations itself.

In another embodiment, instructions to third parties could be batch-processed rather than communicated in real time. The functioning of the kiosk would be the same, except that communications to the host or third party would be made at scheduled intervals, communicating all transactions in a single batch. An alternative to this would be a delayed batch process, where the communications are stored by each kiosk PC, either internally or on removable storage media. A technician would periodically download or remove the data from each kiosk PC for processing.

FIG. 6 shows the steps involved in a typical transaction. Not all possible transactions have been shown; instead, those transactions representative of most transactions have been illustrated. Many other financial transactions could be performed, and would take forms similar to those illustrated.

The initial step 100 for a user at the kiosk is to push start on the touch screen. The user is instructed to put the coins in the input tray and lift the end of the tray to feed the coins into the machine. The machine would then process the coins, and display the value of the coins 110 on the video monitor. The user would then be given three main options: 1) receive a receipt redeemable for cash for the value of the coins; 2) perform an electronic transaction; or 3) have the coins returned and end the transaction. The second step 102 is for the user to choose a transaction. If the user selects a receipt redeemable for cash 104, the receipt is printed immediately, ending the transaction. Similarly, if the user chooses to end the transaction 106, the coins are returned and the transaction is over. When the user chooses to receive a receipt redeemable for the value of the coins, or when the user chooses to end the transaction and remove the coins, the transaction is processed locally and the kiosk does not contact the host computer. If the user chooses a purchase or transaction, the transaction menu 108 is displayed, offering a

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choice of possible types of transactions. Depending on the user's response to this menu, specific contextual menus will display. Choosing a ticket transaction 110, will bring up a menu offering a variety of ticket purchases. Choosing to deposit money 210 will similarly bring up a menu offering a variety of financial institutions. Choosing to pay bills 310 will bring up a menu offering a variety of bill types that may be paid. All three menus also offer an "other" selection in case the item desired by the user is not shown.

Typical ticket transactions 110 are further detailed in FIG. 7. Based on the user's choice from the ticket menu 110, the computer will contact the appropriate remote terminal. The user would be provided a menu of available choices, and provide additional data 112 necessary to purchase the ticket, such as a particular flight, a particular event, specific lottery numbers to choose, a particular movie to watch, or other information. The information is relayed to the remote terminal and a ticket price is displayed 114. This price is compared 116 to the value of the coins previously displayed. If the value of the ticket is less than or equal to the value of the coins, the ticket is purchased and the user is offered a choice 118: receive a receipt redeemable for the difference between the ticket price and the coin value, and end the transaction, or return to the transaction menu 108. If the ticket price is greater than the value of the coins, the additional payment menu 120 is displayed. The user may choose to return to the transaction menu 108, or provide additional payments means. If additional payment is selected, a method of additional payment menu 122 is displayed.

The user may provide currency, which is read and validated 124. If valid, the remote terminal is contacted, the ticket is purchased, payment is subtracted from the combined value of the coins and the currency and a receipt issued 126. The user is then prompted 128 to choose either a redeemable receipt for any overage, or to return to the transaction menu for additional transactions. An overage occurs when the value of the coins added to the valid currency provided exceeds the ticket cost. If the user chooses a redeemable receipt 130, a receipt is printed and the transaction ends. If the user chooses to return to the transaction menu 108, the coin value is increased by the amount of the overage and the transaction menu is displayed.

The method of additional payment menu 122 also offers the use of credit card, debit card, or smart card. The user reads the card in the reader provided, and a remote terminal is contacted to verify the card. If verified, the funds are obtained. The remote terminal is contacted, the ticket is purchased, payment is subtracted from the combined value of the coins and the card, and a receipt issued 134. The user is then prompted 136 to choose between returning to the transaction menu 108 or ending the transaction.

If any method of additional payment is not validated, either currency or card, the try again menu 142 comes up, offering the user the chance to try again, using either the same or a different method of additional payment, or the user may choose to return to the transaction menu 108.

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FIG. 8 provides a detailed diagram of a deposit transaction. From the transaction menu 108, the user chooses deposit money, bringing up a prompt 210 to the user to swipe a bank or ATM card. After swiping the bank or ATM card, the account information screen 212 prompts for the information necessary to access the account. The remote terminal is accessed, and a deposit in the amount of the coin value is made 214. A receipt for the deposit is printed 216 and the transaction is ended.

FIG. 9 details a typical bill paying transaction. From the transaction menu 108 the user chooses to pay a bill, bringing up the bill category menu 310. After selecting the type of bill to be paid, one or more limiting menus 311 may come up, depending on the bill category. For example, if the user selects utility bill from menu 310, menu 311 would come up prompting the user to enter the zip code of the service address, in order to limit the possible utility companies based on which companies provide services in the given geographic area. A second limiting menu would prompt the user to choose the type of utility, such as phone electric gas or water. For example, if the user selected phone bill, company menu 312 would then come up, offering choices of possible phone companies to pay, such as GTE, AT&T, Pacific Bell, Sprint or MCI. Based on that response, the account information screen 314 would prompt the user for the information necessary to access the account and pay the bill. The payment amount screen 314 then prompts the user to enter the desired amount to be paid.

If the amount to be paid is less than the coin value, the remote terminal is contacted, the amount is paid, a receipt is printed and the transaction ends 320. The user is then prompted 322 to choose either a redeemable receipt for any difference between the coin value and the amount of the payment, or to return to the transaction menu 108 for additional transactions. If the user chooses a redeemable receipt 324, a receipt is printed and the transaction ends. If the user chooses to return to the transaction menu 108, the coin value is decreased by the amount of the payment and the transaction menu is displayed 326.

If the amount to be paid is greater than the coin value, the additional payment menu 120 is displayed. The user may choose to return to the transaction menu 108, or provide additional payments means. If the additional payment means is selected, a method of additional payment menu 122 is displayed.

The user may provide currency, which is read and validated 124. If valid, the remote terminal is contacted, the payment is made, the payment is subtracted from the combined value of the coins and the currency and a receipt issued 328. The user is then prompted 330 to choose either a redeemable receipt for any overage, or to return to the transaction menu for additional transactions. An overage occurs when the value of the coins plus the valid currency provided exceeds the amount of payment. If the user chooses a redeemable receipt 332, a receipt is printed and the transaction ends. If the user chooses to return to the transaction menu 108, the coin value

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is increased by the amount of the overage and the transaction menu is displayed 334.

The method of additional payment menu 122 also offers the use of credit card, debit card, or smart card. The user reads the card in the reader provided, and a remote terminal is contacted to verify the card. If verified, the funds are obtained. The remote terminal is contacted, the ticket is purchased, payment is subtracted from the combined value of the coins and the card, and a receipt issued 336. The user is then prompted 338 to choose between returning to the transaction menu 108 or ending the transaction.

If any method of additional payment is not validated, either currency or card, the try again menu 142 comes up, offering the user the chance to try again, using either the same or a different method of additional payment, or the user may choose to return to the transaction menu 108.

It is apparent from the foregoing that embodiments of the present invention satisfies an immediate need for a multi-transactional coin machine. This coin machine may be embodied in other specific forms and can be used with a variety of remote terminals without departing from the spirit or essential attributes of the present invention. It is therefore desired that the described embodiments be considered in all respects as illustrative and not restrictive, reference being made to the appended claims rather than the foregoing description to indicate the scope of the invention.

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CLAIMS

1. A coin counting machine, comprising:

a coin discriminator sensor;

a coin hopper having a container for receiving a plurality of coins, and a feed for feeding the coins in the container to the coin discriminator sensor;

a controller for calculating a monetary value of said coins responsive to said coin discriminator sensor; and

a transport device for transporting the coins from a user to the container at a controlled flow rate, said flow rate being a function of a quantity of coins in the container.

2. The coin counting machine of claim 1 wherein the controller causes the container to dispense debris therefrom after all the coins have been extracted from the container by the feed.

3. The coin counter of claim 2 wherein said feed comprises a moveable backplate bias toward the container and a circular disc rotatably mounted to the moveable backplate, and said controller causes the container to dispense the debris by moving the moveable backplate away from the container.

4. The coin counting machine of claim 1 wherein said transport device comprises a conveyer belt.

5. The coin counting machine of claim 4 further comprising a level sensor for detecting the quantity of coins in the container, said flow rate of the conveyer belt being responsive to the level sensor.

6. The counting coin machine of claim 5 wherein the conveyer belt transports the coins to the container at a fixed flow rate if the level sensor detects that the quantity of coins in the container is below a threshold quantity, and the conveyer belt is stopped if the quantity of coins in the container exceeds said threshold quantity.

7. The coin counting machine of claim 6 wherein said threshold quantity is determined by the level of the coins in the container.

8. The coin counting machine of claim 1 further comprising a coin input tray for receiving said coins from the user and coupling said received coins to the transport device.

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9. The coin machine of claim 8 wherein said coin input tray is adapted to couple coins to the transport device by lifting one end of the input tray, and further comprising a lock down mechanism to selectively prohibit the lifting of said one end of the input tray.

10. A coin counter for a coin machine, comprising:

a coin discriminator sensor;

a coin hopper having a container for receiving a plurality of coins, and a feed for feeding the coins in the container to the coin discriminator sensor; and

a controller for calculating a monetary value of said coins responsive to said coin discriminator sensor, said controller causing the container to dispense debris therefrom after all the coins have been extracted from the container by the feed.

11. The coin counter of claim 9 wherein said feed comprises a moveable backplate bias toward the container and a circular disc rotatably mounted to said moveable backplate, and said controller causes the container to dispense the debris by moving the moveable backplate away from the container.

12. The coin counter of claim 10 further comprising a coin rail for coupling the coins from the feed to the coin discriminator sensor, said feed feeding the coins onto the coin rail one coin at a time.

13. The coin counter of claim 12 wherein said controller determines the authenticity of each of the coins responsive to the coin discrimination sensor, and the monetary value calculated based only on the coins determined to be authentic.

14. The coin counter of claim 13 further comprising a solenoid mounted to the coin rail for removing the coins determined to be non-authentic by the controller from the coin rail.

15. A multi-transactional coin machine, comprising:

a coin counting module for counting a plurality of coins, and calculating a monetary value therefor;

a user interface for selecting one of a plurality of transactions; and

a controller for generating instructions for a remote terminal, said instructions comprising a command to apply the calculated monetary value of the coins to the selected one of the transactions.

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16. The multi-transactional coin machine of claim 15 further comprising a coin input tray for receiving said coins from the user, and coupling said received coins to the coin counting module.

17. The multi-transactional coin machine of claim 16 further comprising a non-coin acceptor for receiving non-coins from said user, and wherein said coin counting module calculates a monetary value for said non-coins and said instruction comprises a command to apply a sum of said calculated monetary value of the coins and said calculated monetary value of the non-coins to the selected one of said transactions.

18. The multi-transactional coin machine of claim 17 wherein said non-coin acceptor comprises a currency acceptor.

19. The multi-transactional coin machine of claim 17 wherein said non-coin acceptor comprises a card reader.

20. A method for performing transactions with a remote service provider from a coin machine, comprising the steps of:

receiving, at the coin machine, a plurality of coins from a user;

discriminating denominations of said coins;

calculating a monetary value of said coins as a function of said discriminated denominations;

selecting, at the coin machine, one of a plurality of transactions;

generating instructions for said remote service provider, said instructions comprising a command to apply said calculated monetary value of the coins to the selected one of the transactions;

transmitting said instructions to a said service provider; and

consummating said selected transaction at the service provider.

21. The method of claim 20 wherein the transmitting step comprises transmitting said instructions to a host terminal, formatting said instructions at said host terminal according to a protocol, and transmitting said formatted instructions to said service provider.

22. The method of claim 21 wherein the transmitting step further comprises determining, at the host terminal, the service provider for the selected transaction from a plurality of service providers from said instructions.

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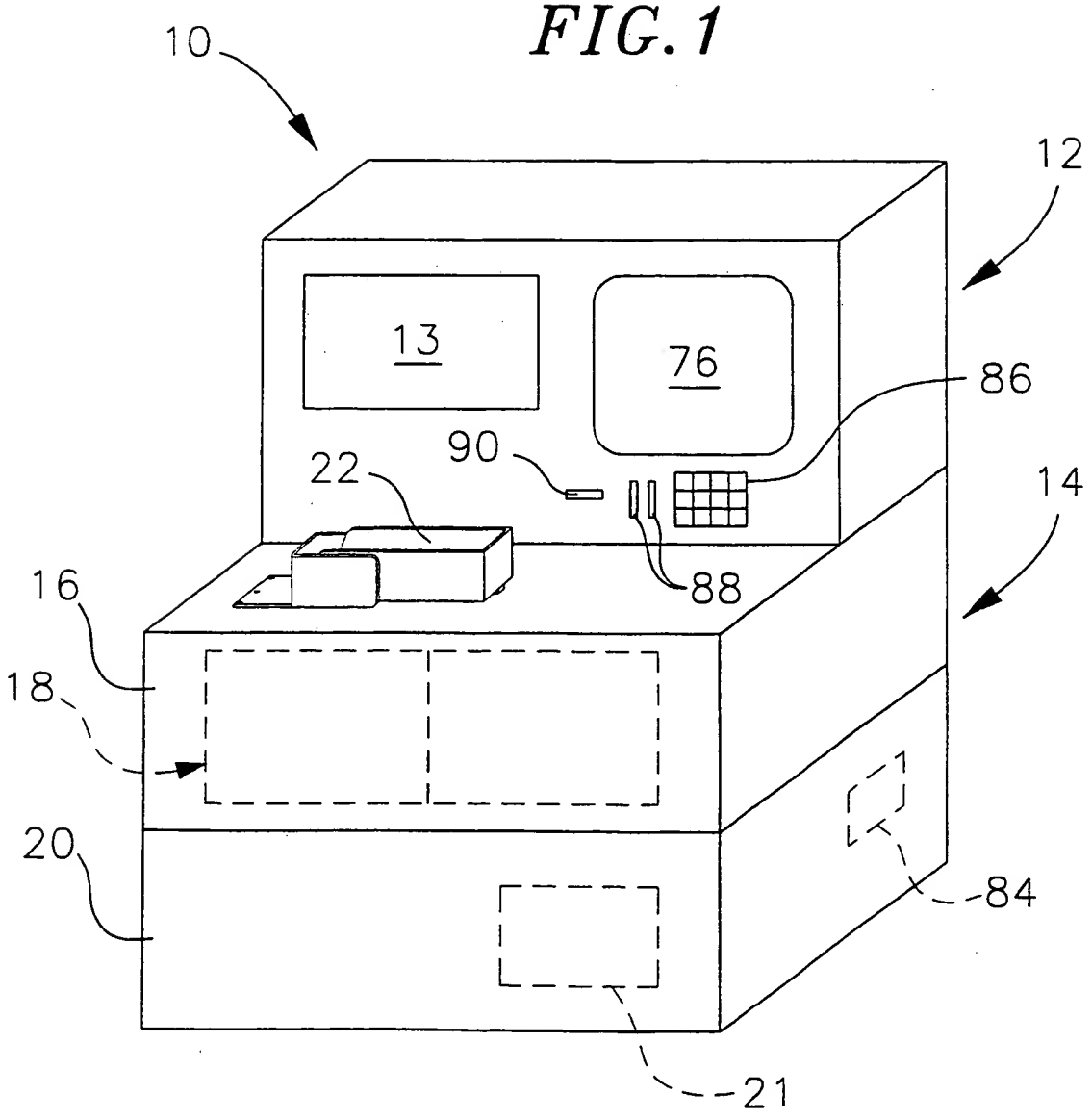
FIG. 1



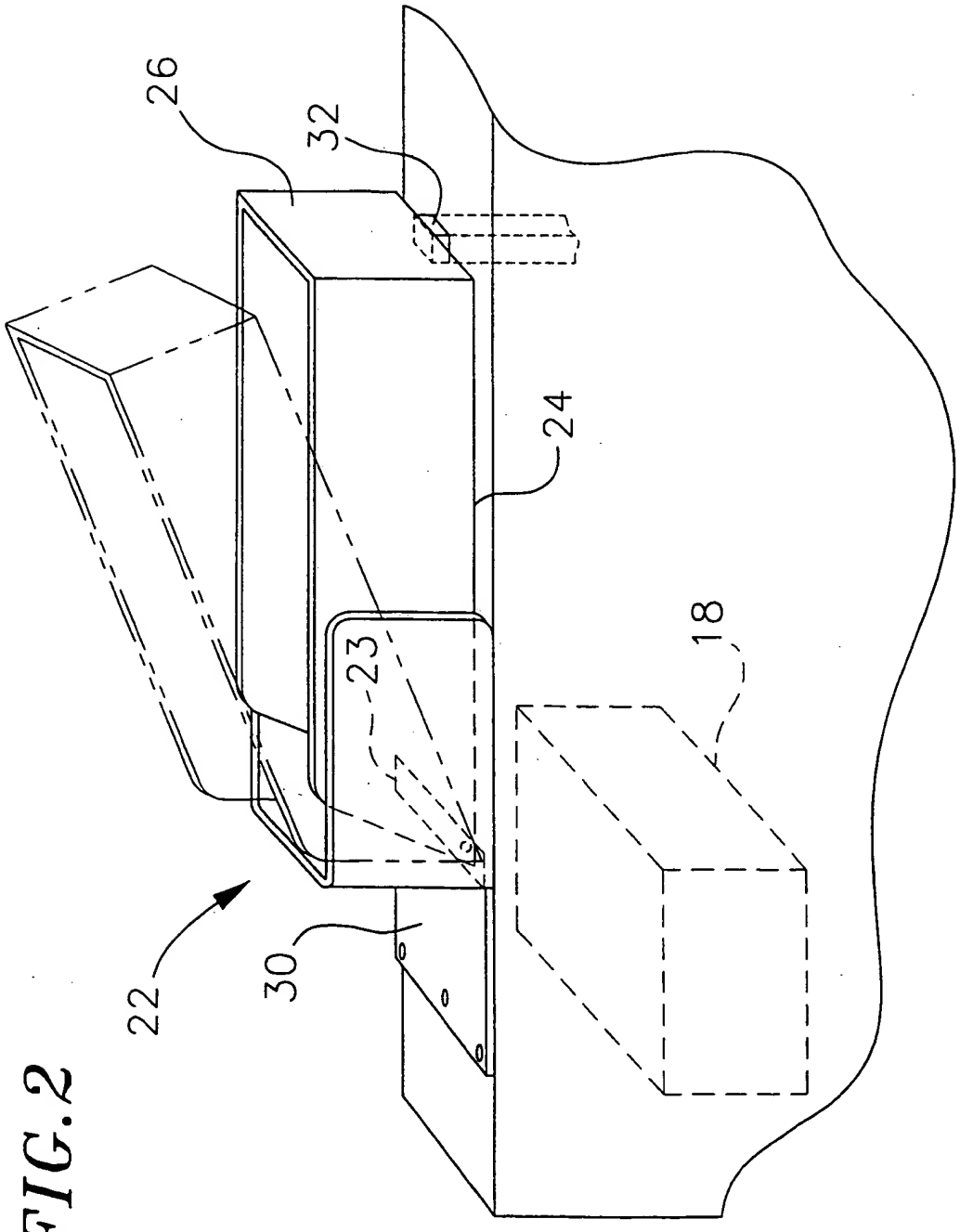


FIG. 2

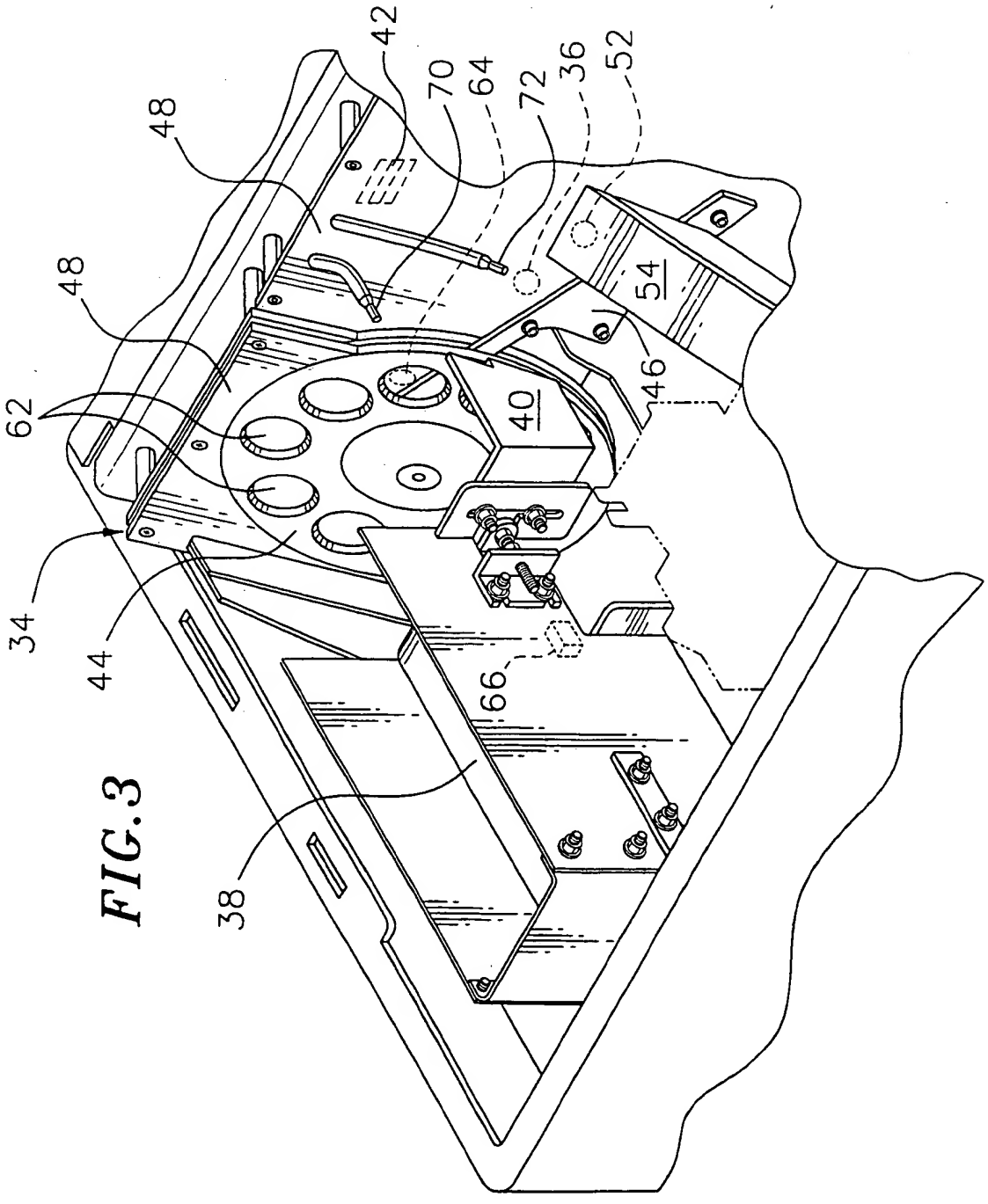


FIG. 3

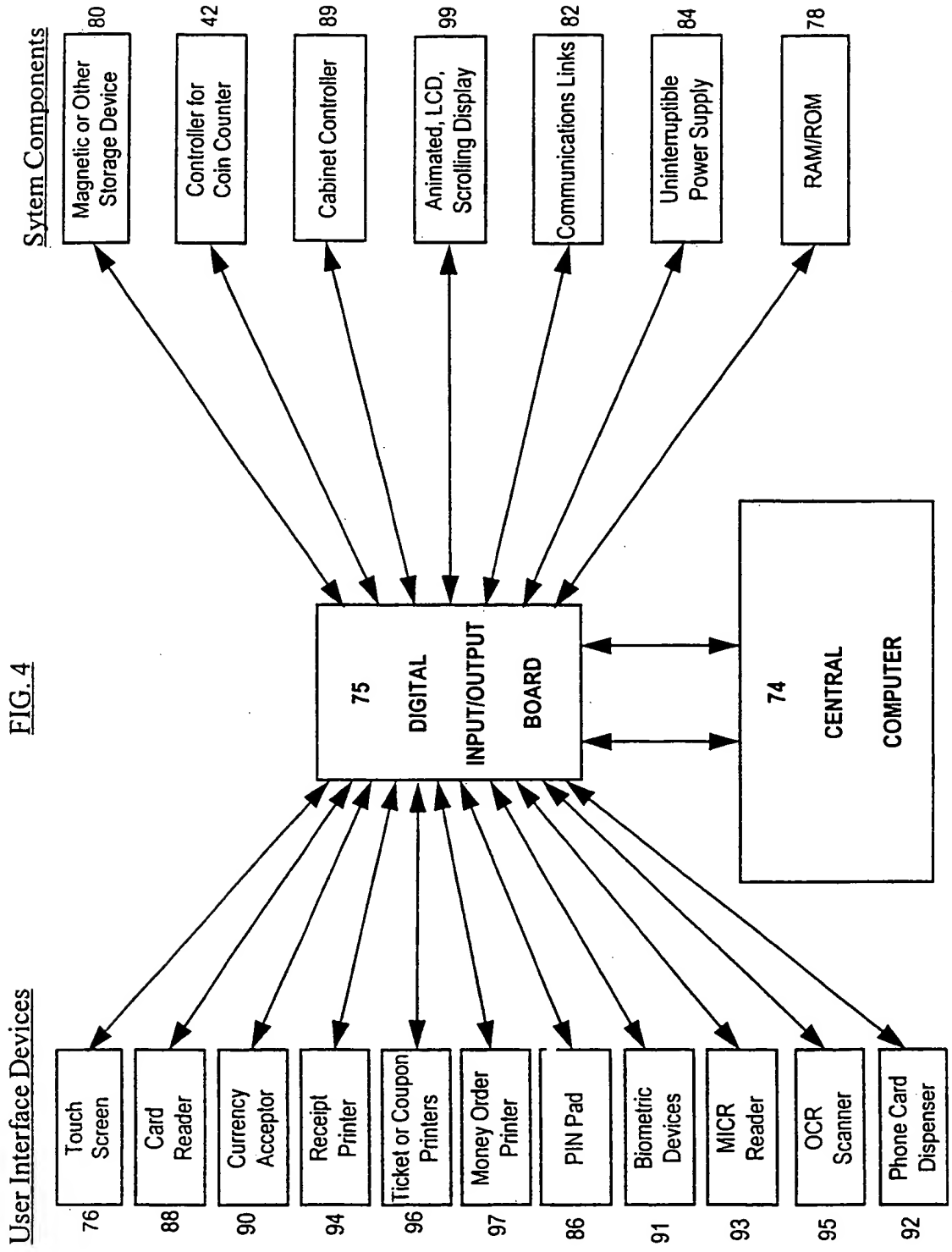

Sytem Components
Magnetic or Other Storage Device
80
Controller for Coin Counter
42
Cabinet Controller
89
Animated, LCD, Scrolling Display
99
Communications Links
82
Uninterruptible Power Supply
84
RAM/ROM
78
75 DIGITAL INPUT/OUTPUT BOARD
74 CENTRAL COMPUTER
User Interface Devices
Touch Screen
76
Card Reader
88
Currency Acceptor
90
Receipt Printer
94
Ticket or Coupon Printers
96
Money Order Printer
97
PIN Pad
86
Biometric Devices
91
MICR Reader
93
OCR Scanner
95
Phone Card Dispenser
92

FIG. 4

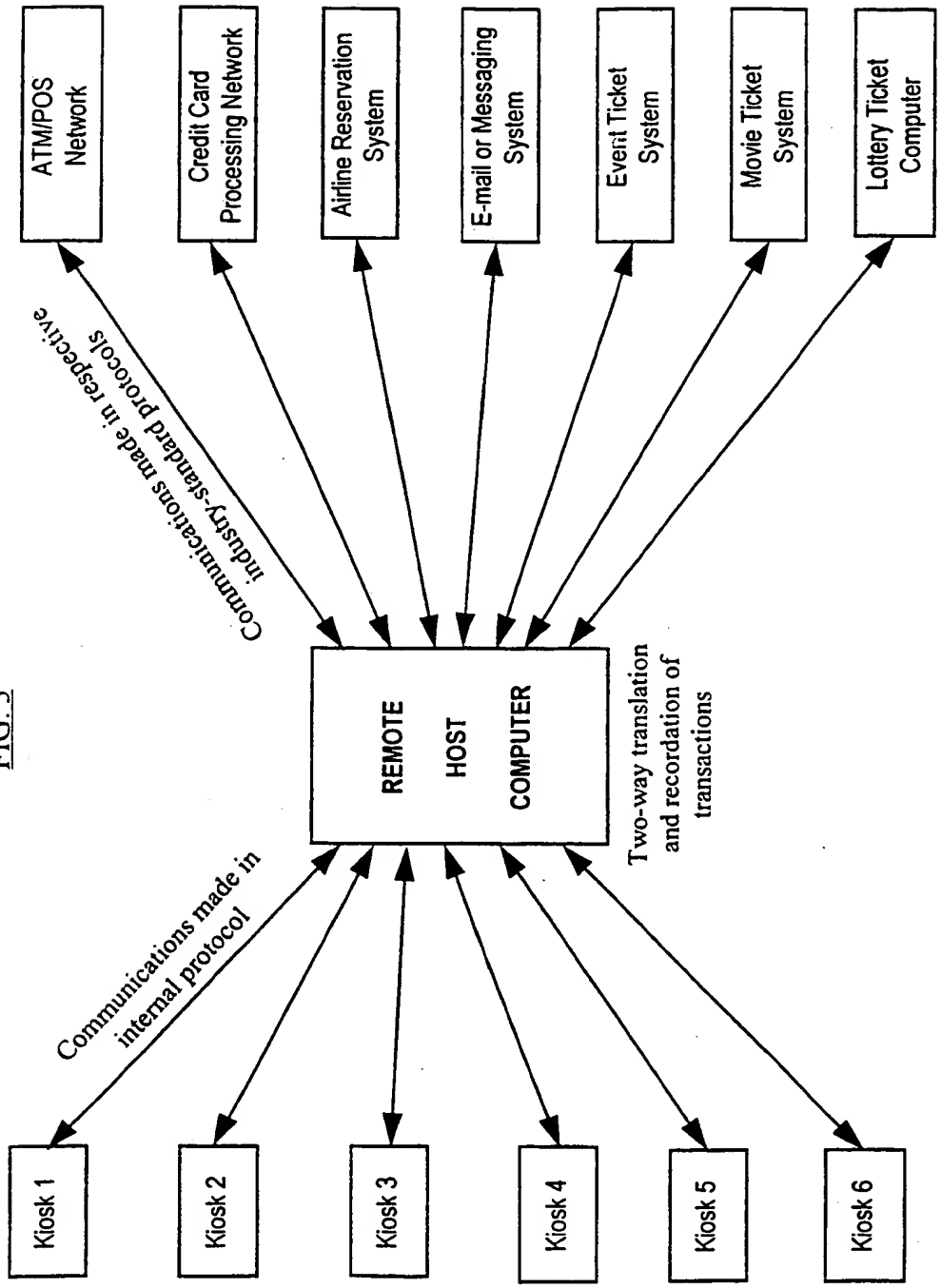

ATM/POS Network
Credit Card Processing Network
Airline Reservation System
E-mail or Messaging System
Event Ticket System
Movie Ticket System
Lottery Ticket Computer
Communications made in industry-standard protocols
REMOTE HOST COMPUTER
Two-way translation and recordation of transactions
Communications made in internal protocol
Kiosk 1
Kiosk 2
Kiosk 3
Kiosk 4
Kiosk 5
Kiosk 6

FIG. 5

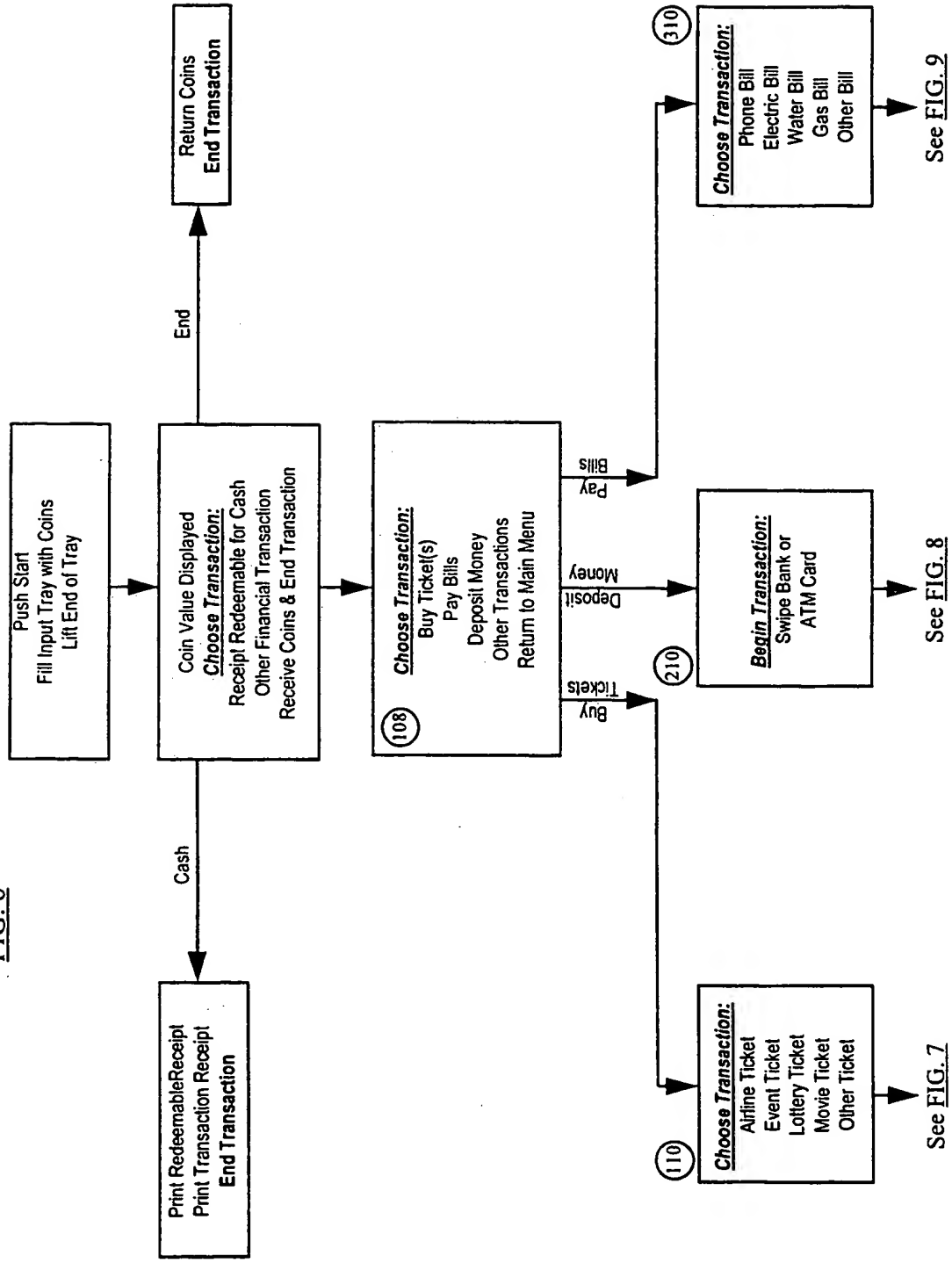

Push Start
Fill Input Tray with Coins
Lift End of Tray
Coin Value Displayed
Choose Transaction:
Receipt Redeemable for Cash
Other Financial Transaction
Receive Coins & End Transaction
End
Return Coins
End Transaction
Cash
Print RedeemableReceipt
Print Transaction Receipt
End Transaction
108
Choose Transaction:
Buy Ticket(s)
Pay Bills
Deposit Money
Other Transactions
Return to Main Menu
Pay Bills
Deposit Money
Buy Tickets
310
Choose Transaction:
Phone Bill
Electric Bill
Water Bill
Gas Bill
Other Bill
See FIG. 9
210
Begin Transaction:
Swipe Bank or
ATM Card
See FIG. 8
110
Choose Transaction:
Airline Ticket
Event Ticket
Lottery Ticket
Movie Ticket
Other Ticket
See FIG. 7

FIG. 6

FIG. 7

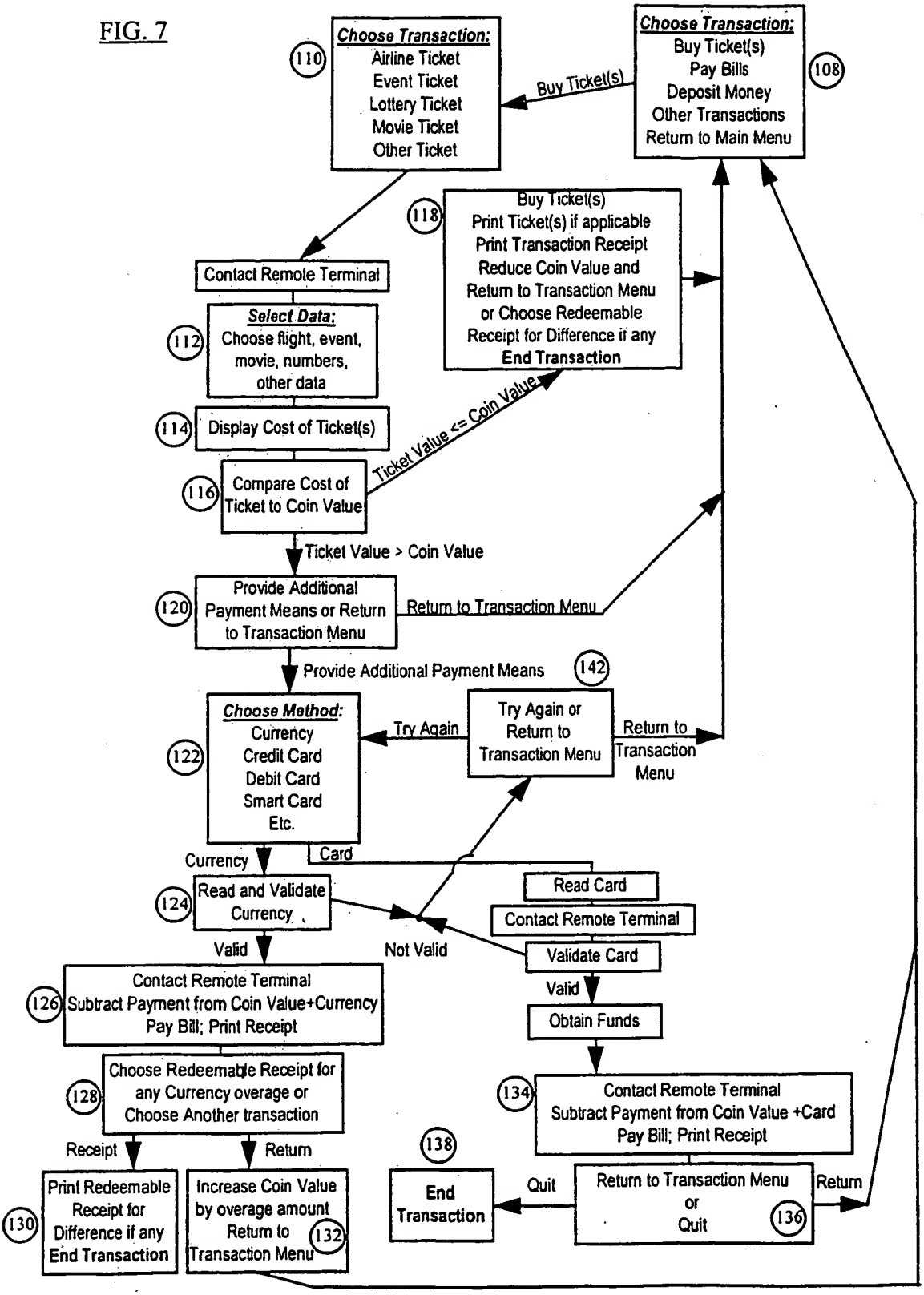

Choose Transaction:
Buy Ticket(s)
Pay Bills
Deposit Money
Other Transactions
Return to Main Menu
108
Buy Ticket(s)
110
Choose Transaction:
Airline Ticket
Event Ticket
Lottery Ticket
Movie Ticket
Other Ticket
Contact Remote Terminal
Select Data:
Choose flight, event, movie, numbers, other data
112
Display Cost of Ticket(s)
114
Compare Cost of Ticket to Coin Value
116
Ticket Value <= Coin Value
Buy Ticket(s)
Print Ticket(s) if applicable
Print Transaction Receipt
Reduce Coin Value and
Return to Transaction Menu
or Choose Redeemable
Receipt for Difference if any
End Transaction
118
Ticket Value > Coin Value
Provide Additional Payment Means or Return to Transaction Menu
120
Return to Transaction Menu
Provide Additional Payment Means
142
Choose Method:
Currency
Credit Card
Debit Card
Smart Card
Etc.
122
Try Again
Try Again or Return to Transaction Menu
Return to Transaction Menu
Currency
Card
Read and Validate Currency
124
Read Card
Contact Remote Terminal
Validate Card
Valid
Not Valid
Valid
Obtain Funds
Contact Remote Terminal
Subtract Payment from Coin Value+Currency
Pay Bill; Print Receipt
126
Choose Redeemable Receipt for any Currency overage or Choose Another transaction
128
Receipt
Return
Contact Remote Terminal
Subtract Payment from Coin Value +Card
Pay Bill; Print Receipt
134
138
End Transaction
Quit
Return to Transaction Menu or Quit
136
Return
Print Redeemable Receipt for Difference if any
End Transaction
130
Increase Coin Value by overage amount Return to Transaction Menu
132

FIG.8

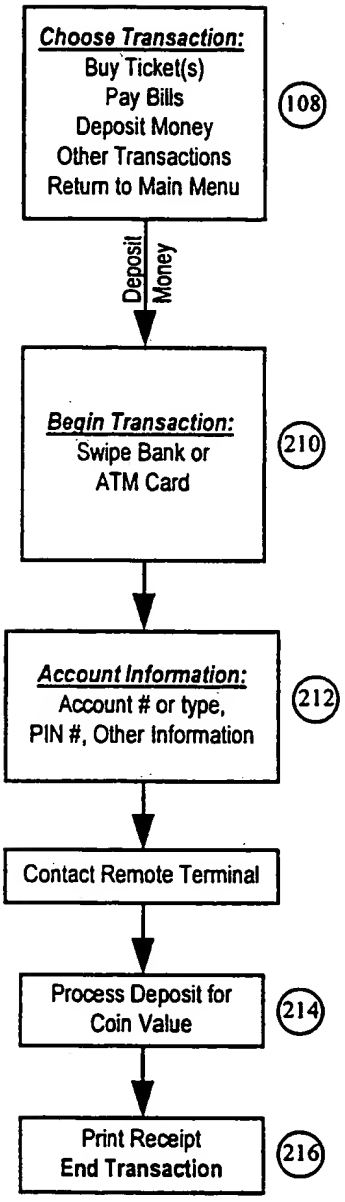
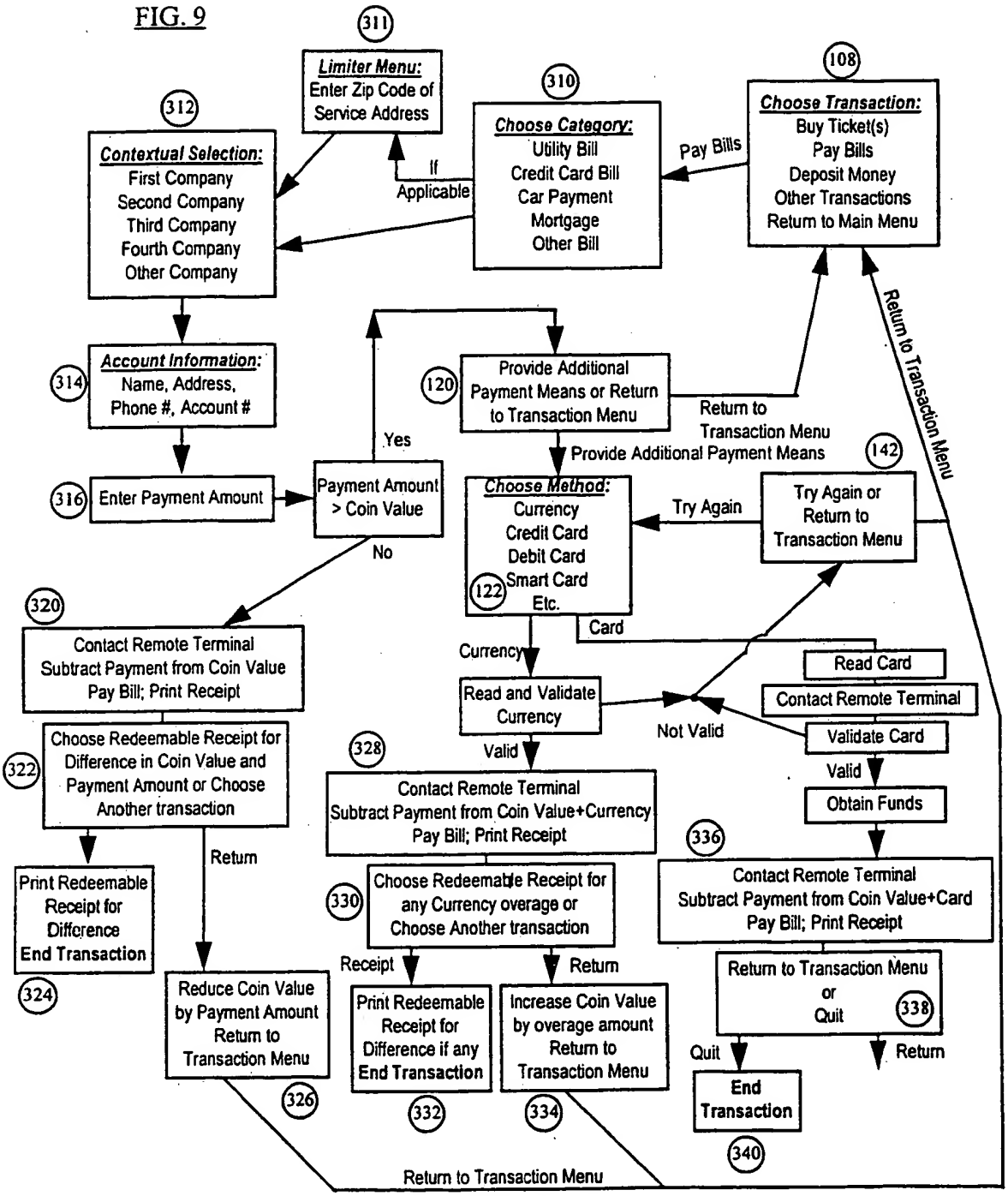

Choose Transaction:
Buy Ticket(s)
Pay Bills
Deposit Money
Other Transactions
Return to Main Menu
108
Deposit Money
Begin Transaction:
Swipe Bank or ATM Card
210
Account Information:
Account # or type, PIN #, Other Information
212
Contact Remote Terminal
Process Deposit for Coin Value
214
Print Receipt
End Transaction
216

FIG. 9


311
Limiter Menu:
Enter Zip Code of Service Address
310
Choose Category:
Utility Bill
Credit Card Bill
Car Payment
Mortgage
Other Bill
108
Choose Transaction:
Buy Ticket(s)
Pay Bills
Deposit Money
Other Transactions
Return to Main Menu
Pay Bills
If Applicable
312
Contextual Selection:
First Company
Second Company
Third Company
Fourth Company
Other Company
314
Account Information:
Name, Address, Phone #, Account #
316
Enter Payment Amount
Payment Amount > Coin Value
Yes
No
120
Provide Additional Payment Means or Return to Transaction Menu
Return to Transaction Menu
Provide Additional Payment Means
Return to Transaction Menu
142
Try Again or Return to Transaction Menu
Try Again
Choose Method:
Currency
Credit Card
Debit Card
Smart Card
Etc.
122
Card
Currency
320
Contact Remote Terminal
Subtract Payment from Coin Value
Pay Bill; Print Receipt
Read and Validate Currency
Not Valid
Valid
Read Card
Contact Remote Terminal
Validate Card
Valid
Obtain Funds
322
Choose Redeemable Receipt for Difference in Coin Value and Payment Amount or Choose Another transaction
328
Contact Remote Terminal
Subtract Payment from Coin Value+Currency
Pay Bill; Print Receipt
336
Contact Remote Terminal
Subtract Payment from Coin Value+Card
Pay Bill; Print Receipt
Return
Print Redeemable Receipt for Difference
End Transaction
324
330
Choose Redeemable Receipt for any Currency overage or Choose Another transaction
Receipt
Return
Return to Transaction Menu or Quit
338
Quit
Return
End Transaction
340
Reduce Coin Value by Payment Amount
Return to Transaction Menu
326
Print Redeemable Receipt for Difference if any
End Transaction
332
Increase Coin Value by overage amount
Return to Transaction Menu
334
Return to Transaction Menu

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/22534

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :G07F 17/42
US CL :194/217
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 194/216,217,218,347,348,349; 453/017

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X _ Y	US 5,564,546 A (MOLBAK et al) 15 OCTOBER 1996 (15.10.96), col. 6, lines 5-54. " "	15,16,20-22 _____ 1,2,4- 8,10, 12-14,17-19
Y	US 5,531,640 A (INOUE) 02 JULY 1996 (02.07.96), col.4, lines 21-38.	1,2,4-8
Y	JP 3-63795 A (FUKUDA) 19 MARCH 1991 (19.03.91), figures 1-3.	2,10,12-14
Y	GB 2,188,467 A (CONNER et al) 30 SEPTEMBER 1987 (30.09.87), page 1, lines 109-130.	17-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 22 DECEMBER 1998	Date of mailing of the international search report 26 JAN 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer F. J. BARTUSKA Telephone No. (703) 308-1111

Form PCT/ISA/210 (second sheet)(July 1992)★

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